

# SN Ia Evolution

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## When Massive Stars Explode: SNe 2006jc & 2006gy

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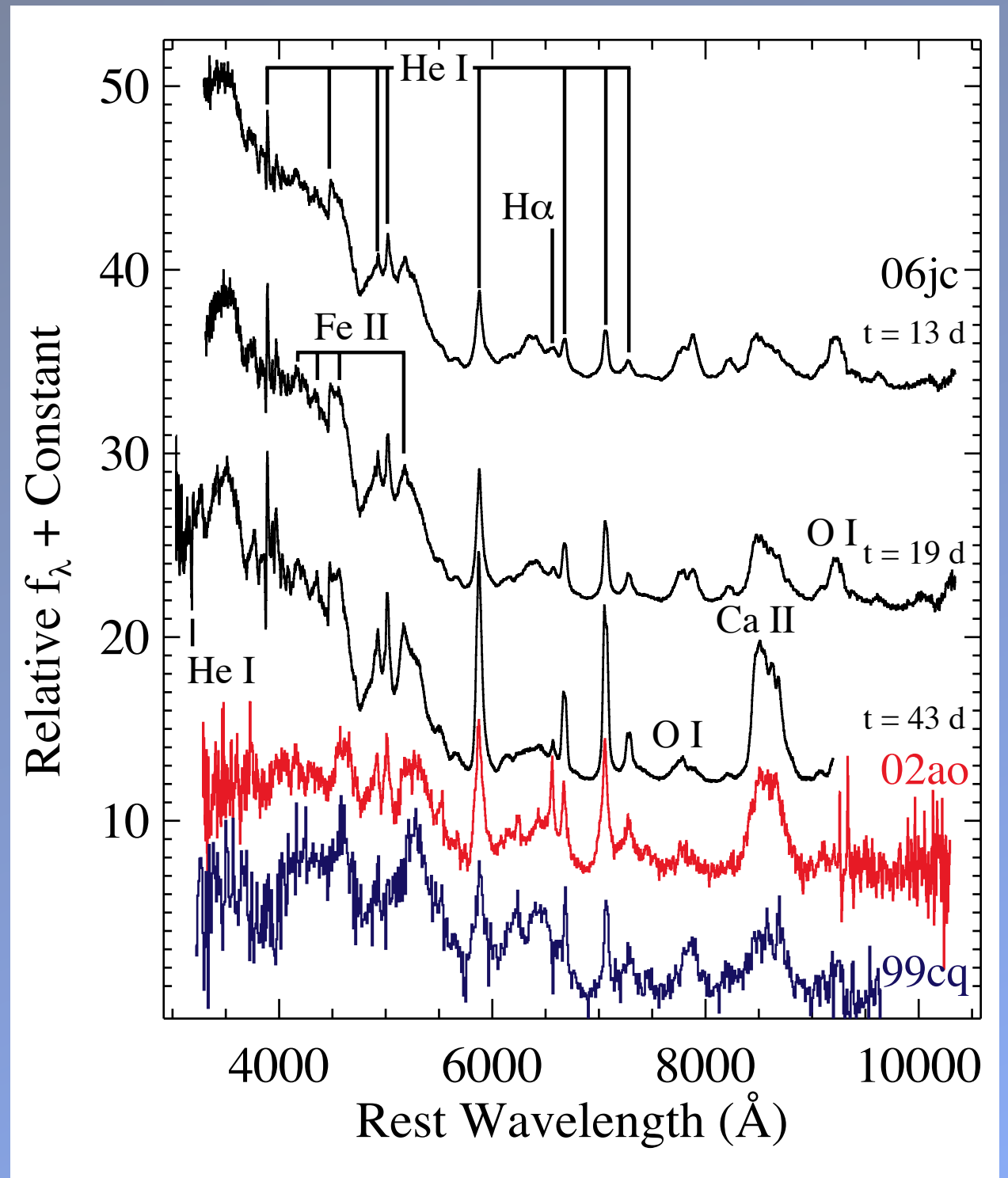
~500 nearby SNe Ia with ~1100 spectra  
~500 spectra from SNe with light curve  
information

~150 high-z ESSENCE spectra

Come talk to me or read about it in my  
thesis in 15 months

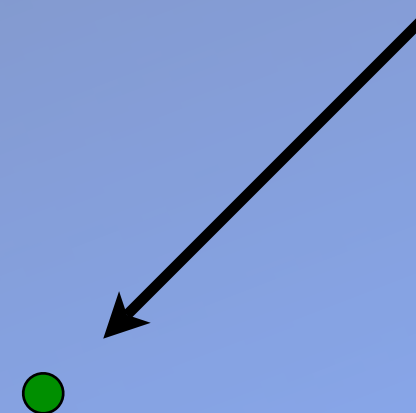
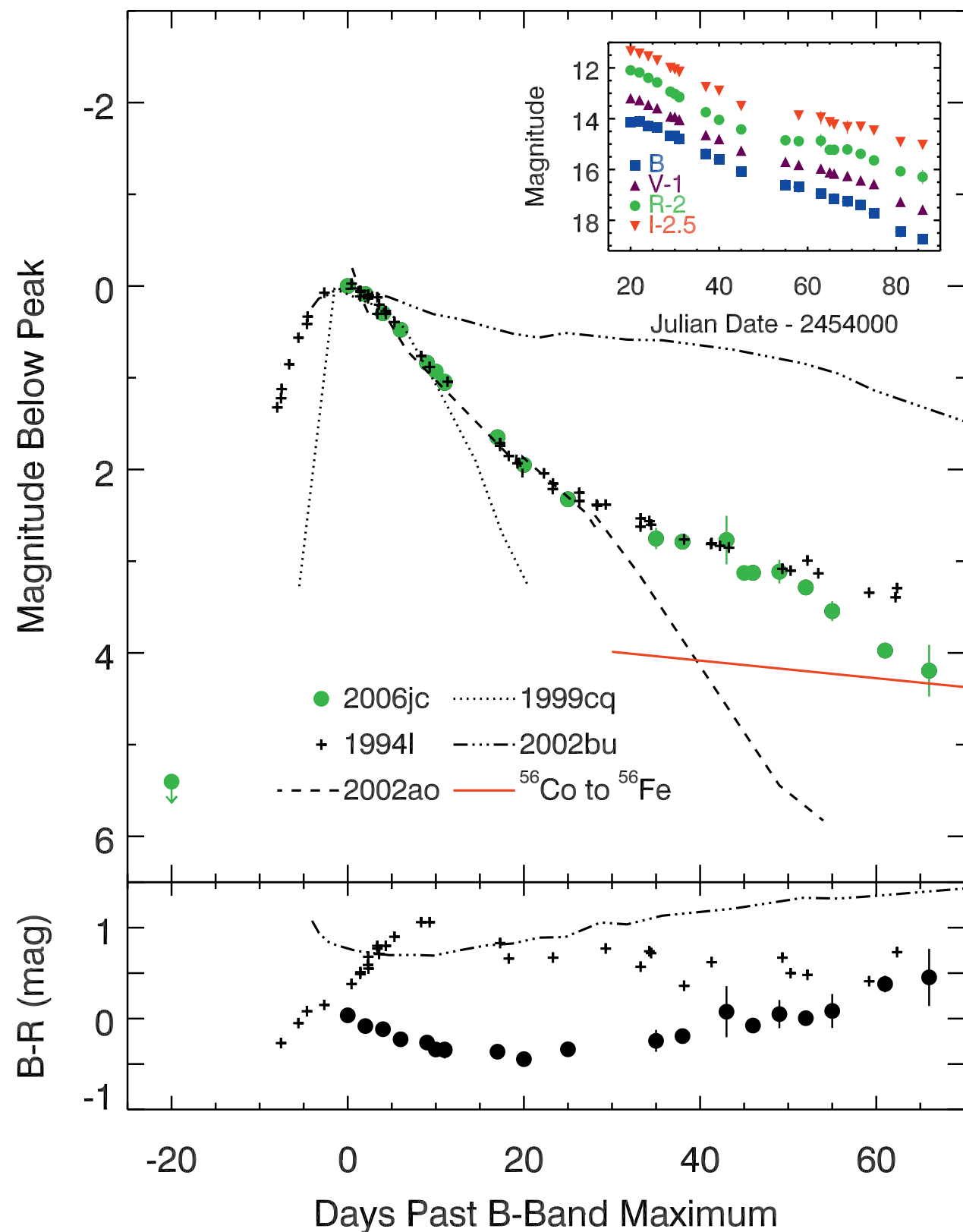
# SN 2006jc

- Narrow He Lines
- Very Blue Continuum
- Double-Peaked/Flat-Topped He Lines
- Relatively Fast Light Curve Decline



Foley et al. 2007 (in press)

# Current Light Curve Decline

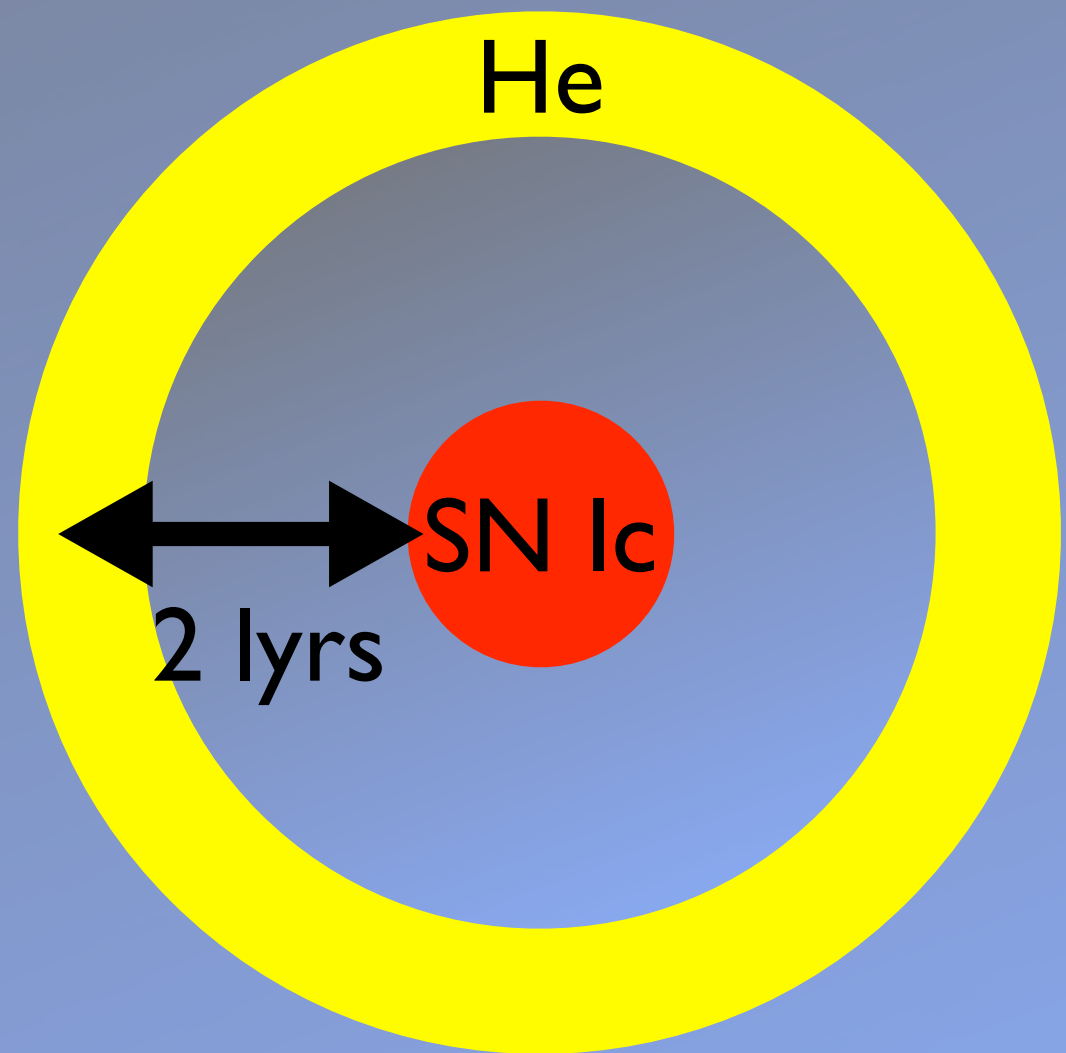


He Shell Ejected In  
Luminous Explosion of 2004

CS Interaction Causing  
Narrow He Lines

Fe Lines (Fluorescence or  
Collisional Excitation)  
Causing Blue Continuum

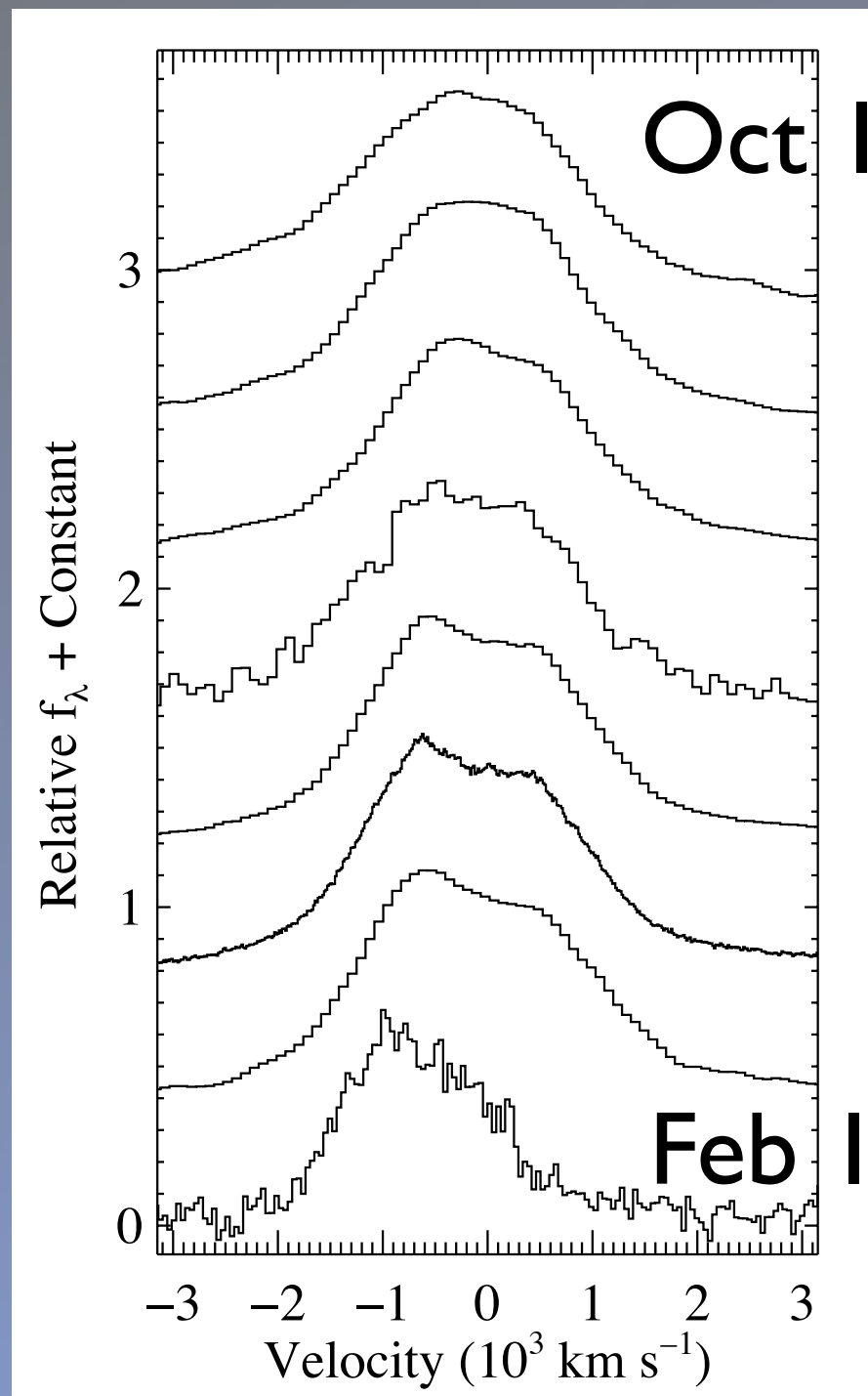
Wolf-Rayet Star With LBV-  
like Eruption



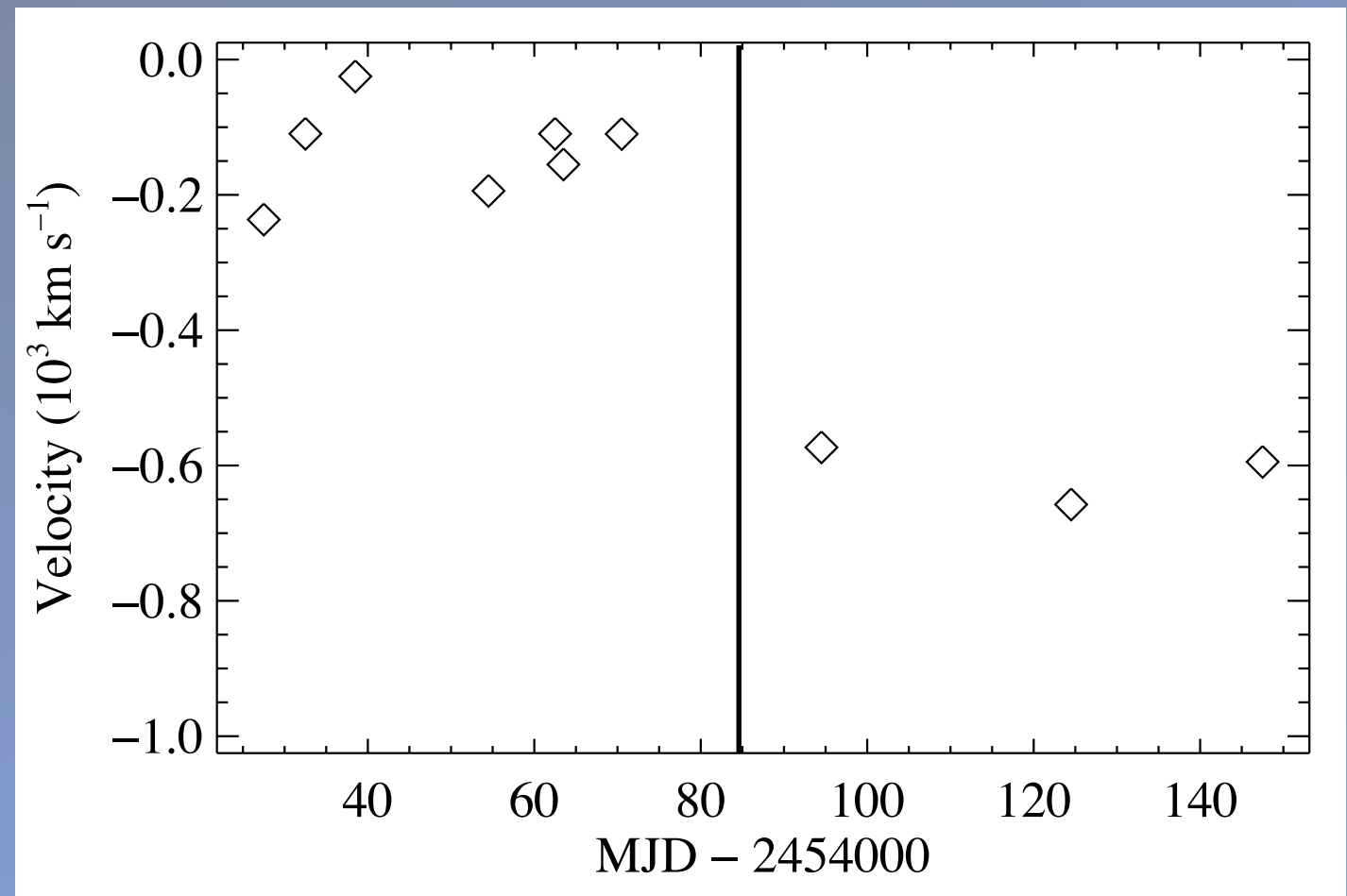


Time

# Indications of Dust



He I 7065

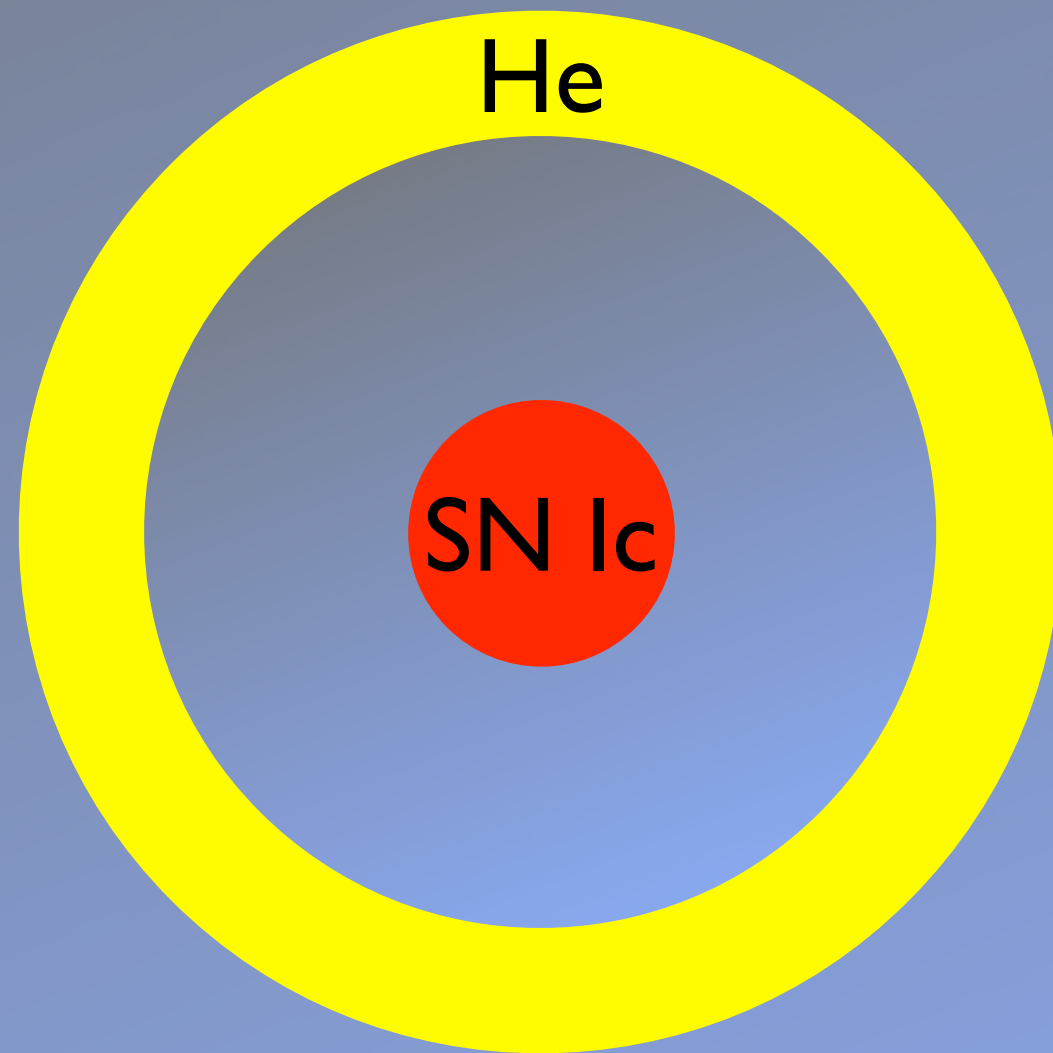


NIR bump starting ~Dec 6  
(Arkharov et al. 2006)

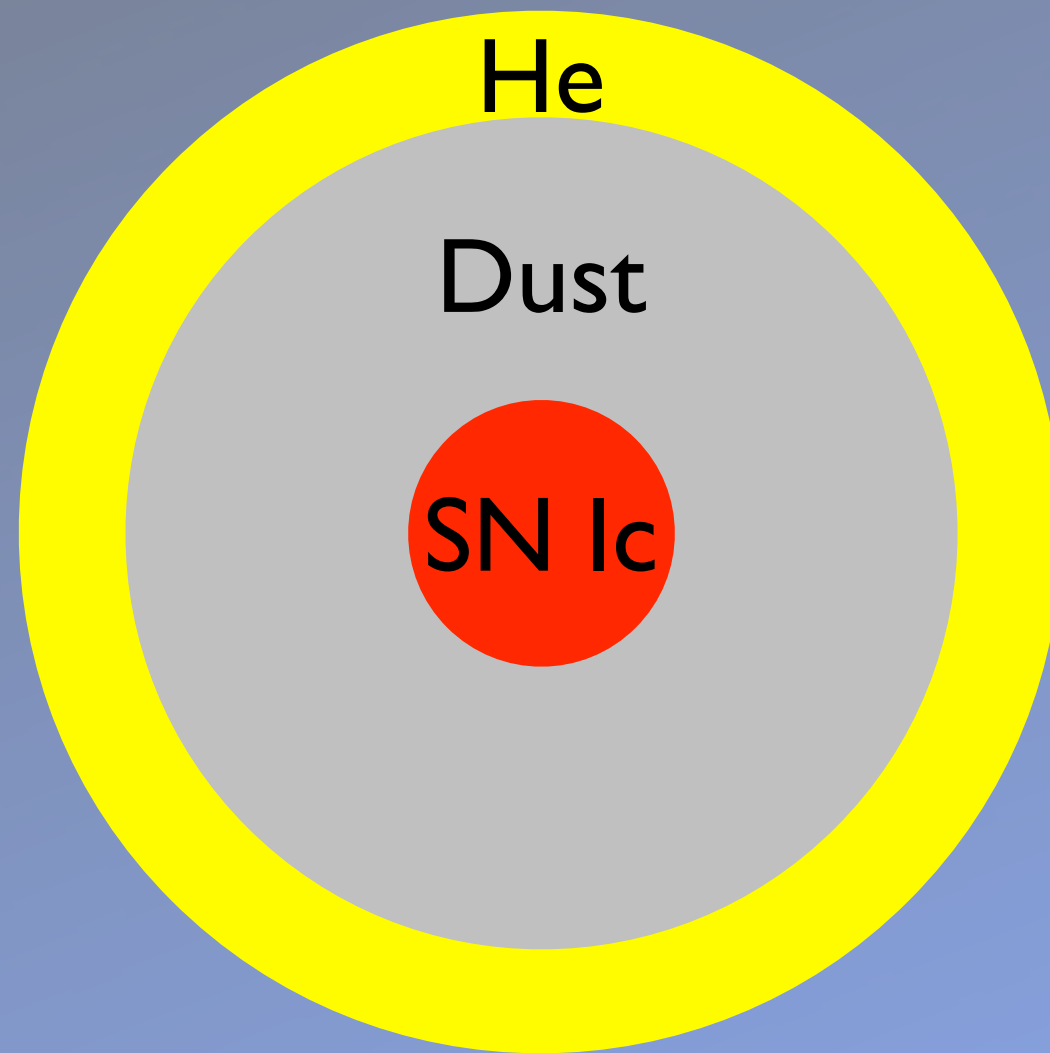
Similar to 1998S (Leonard et al. 2000)



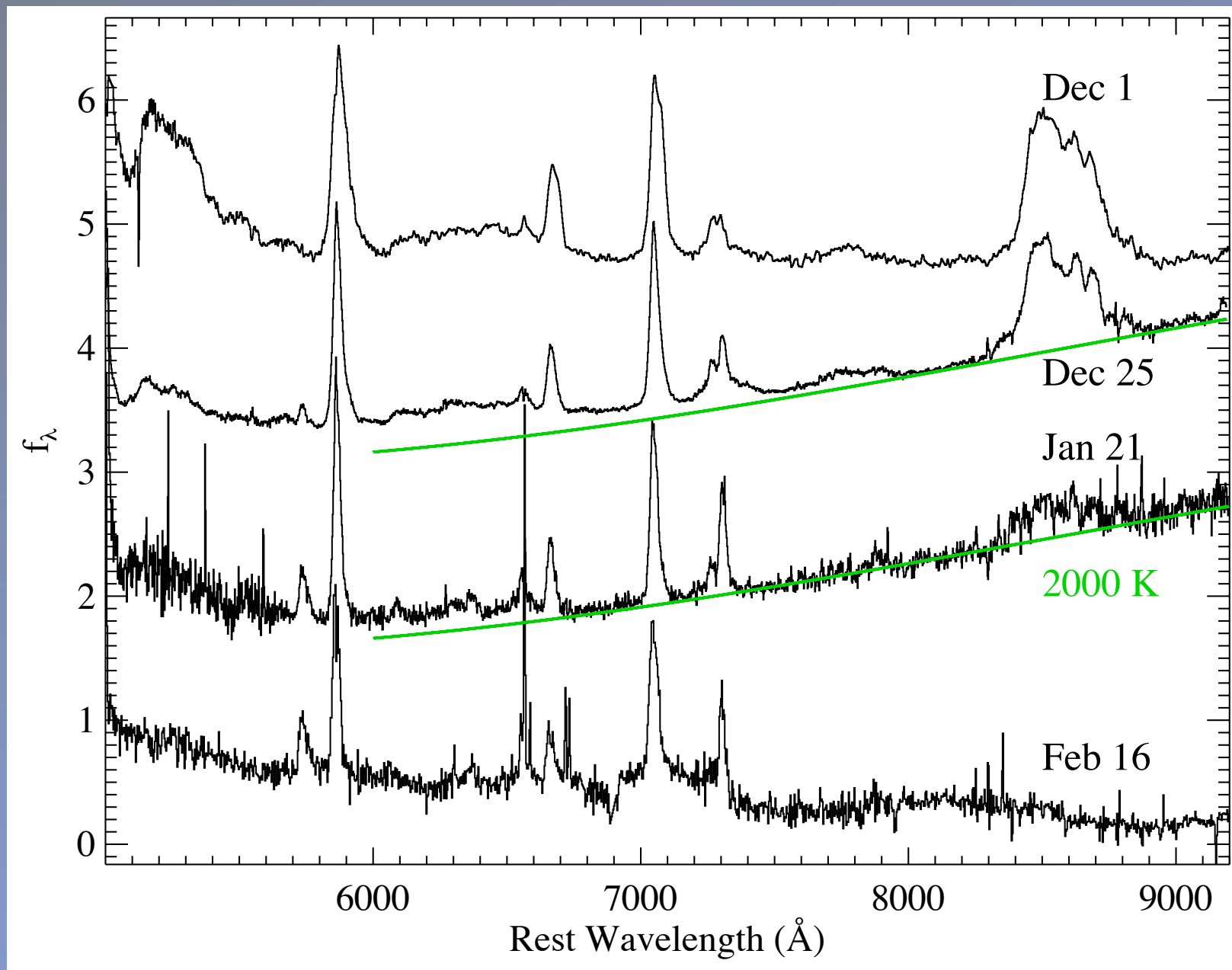
# Dust Creation?



# Dust Creation?

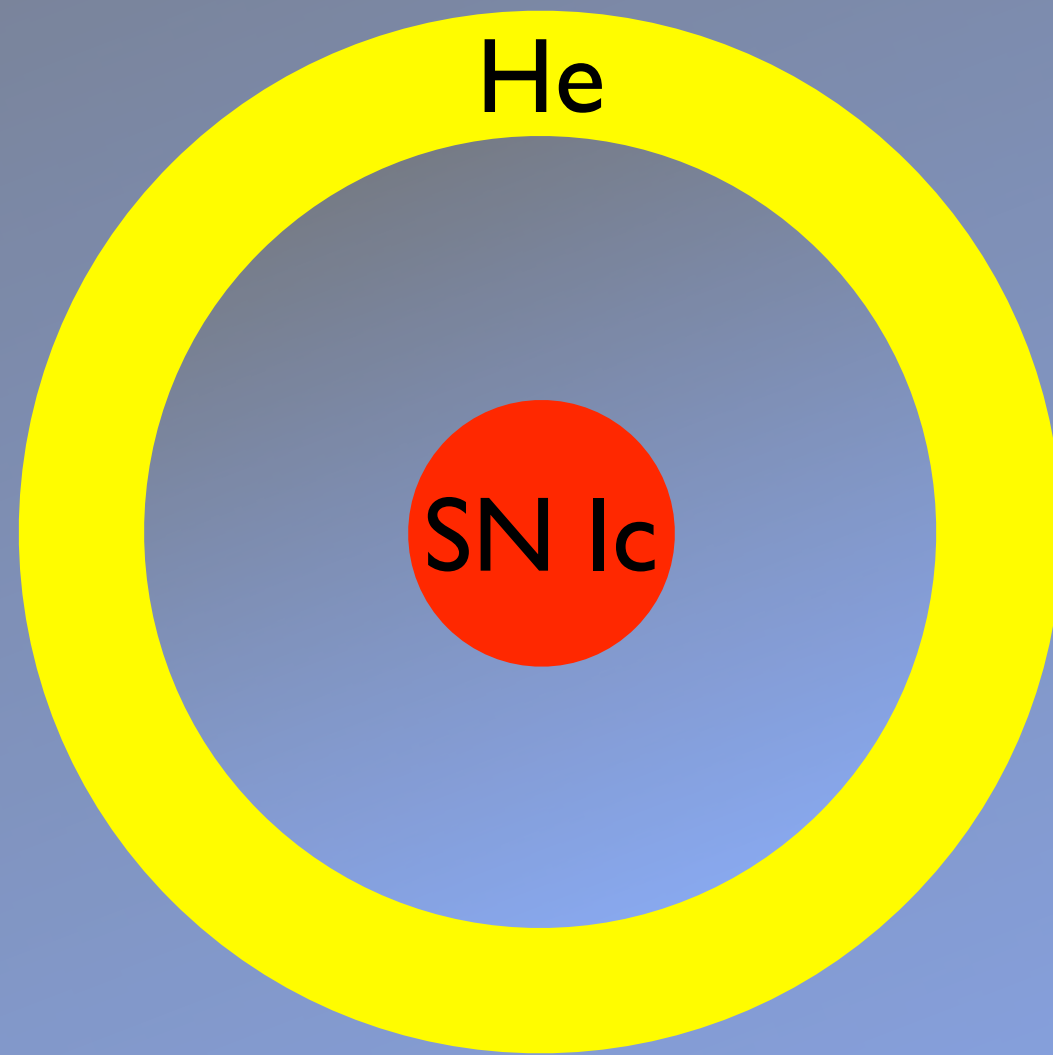


# Hot Dust



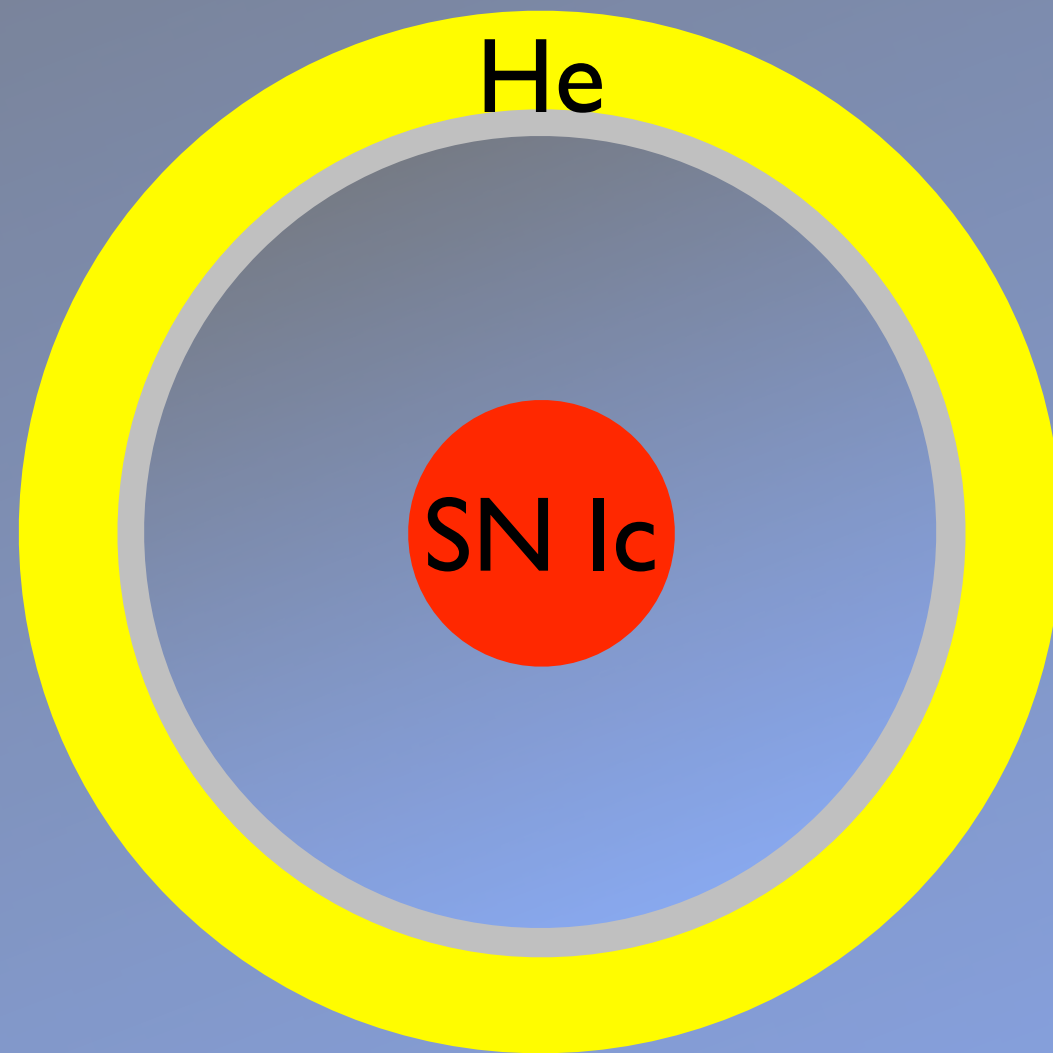
NIR light curves show similar increase

# Dust Heating/Creation/Destruction?



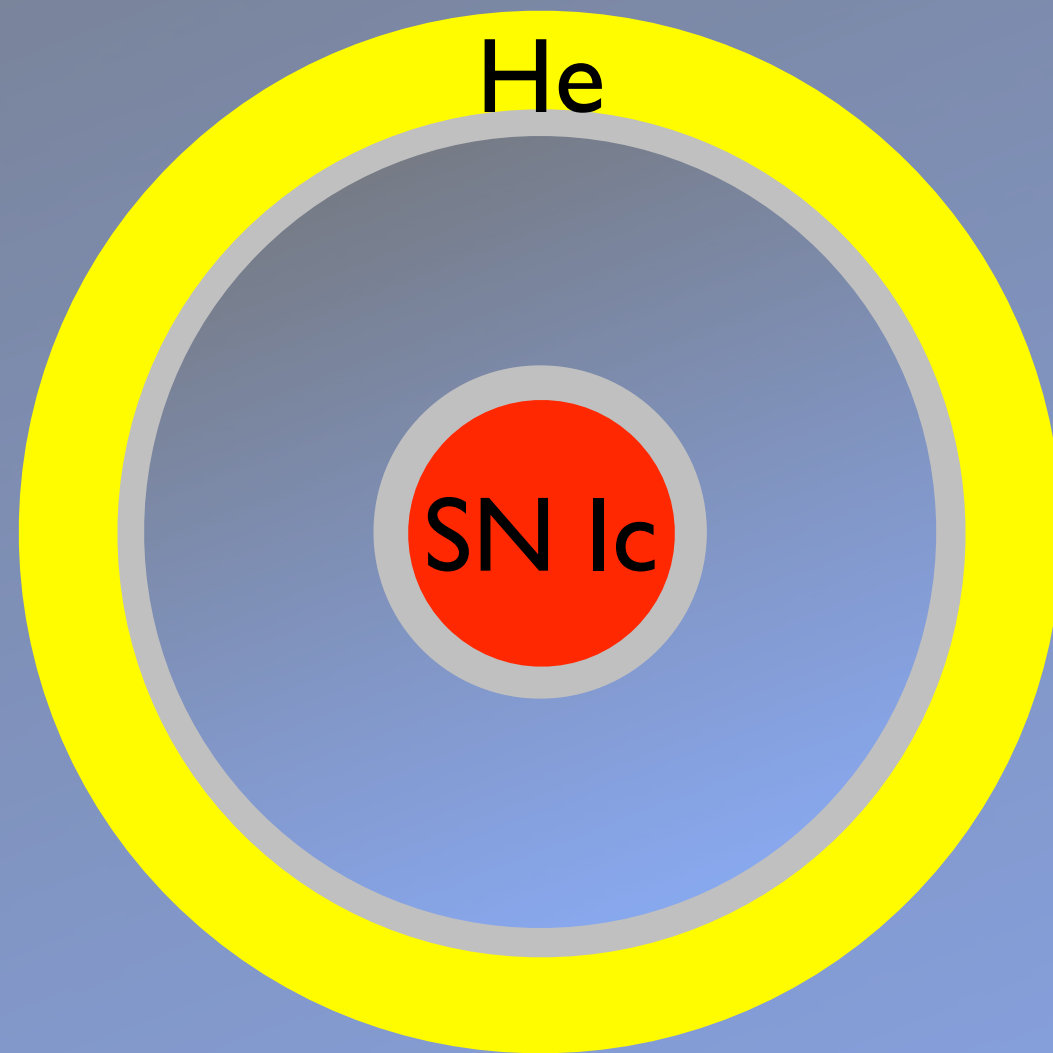
See Maryam Modjaz's Talk For More

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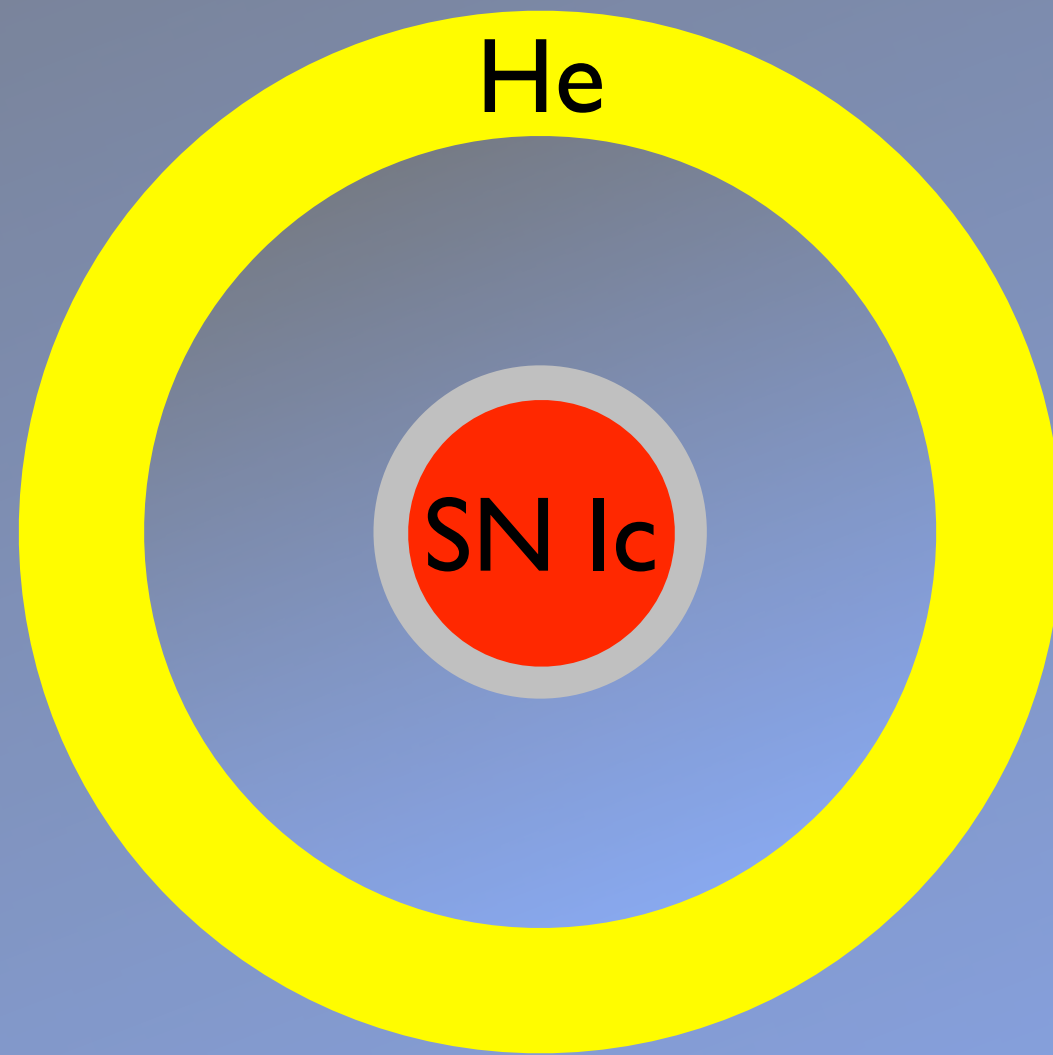
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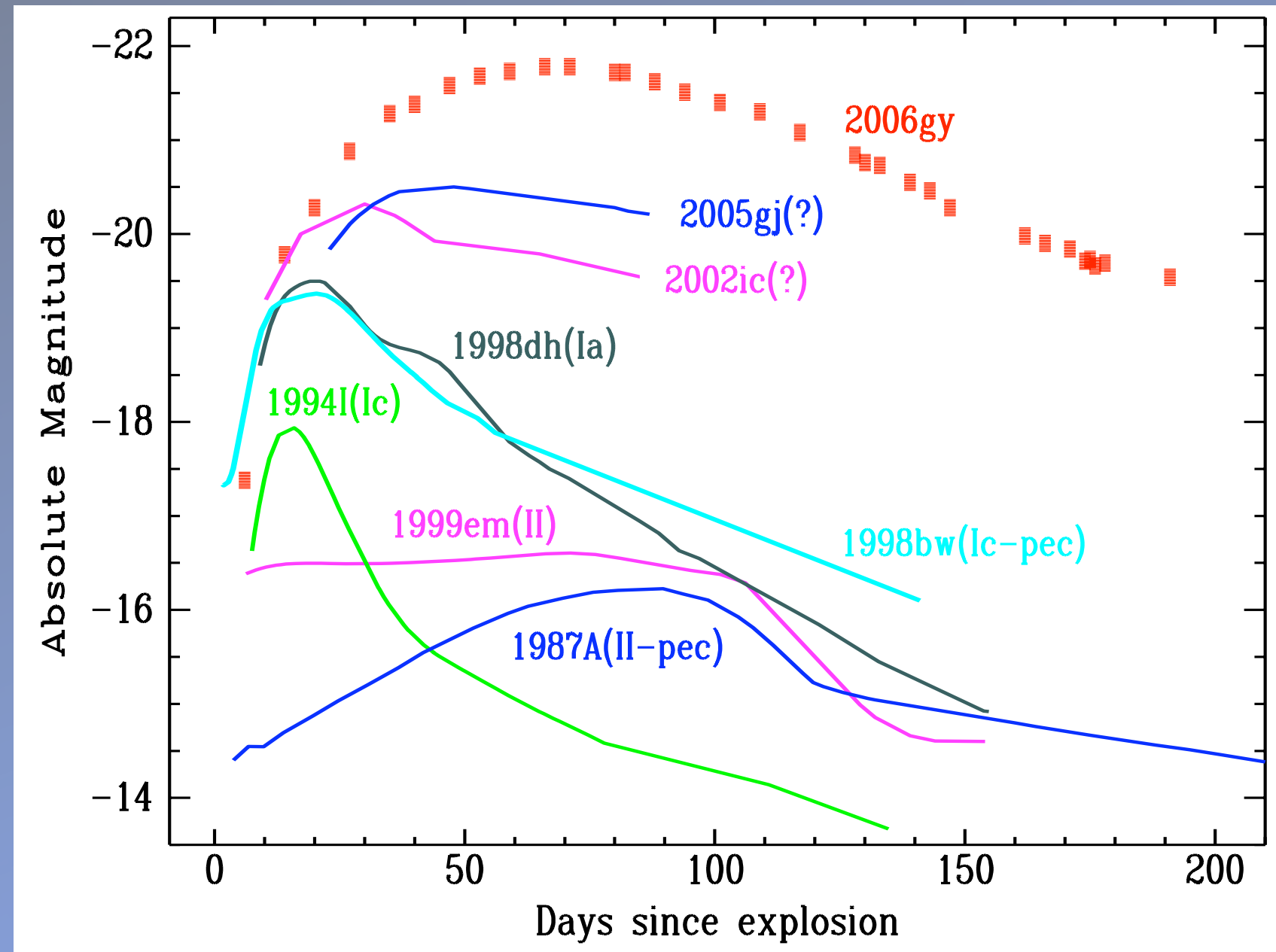


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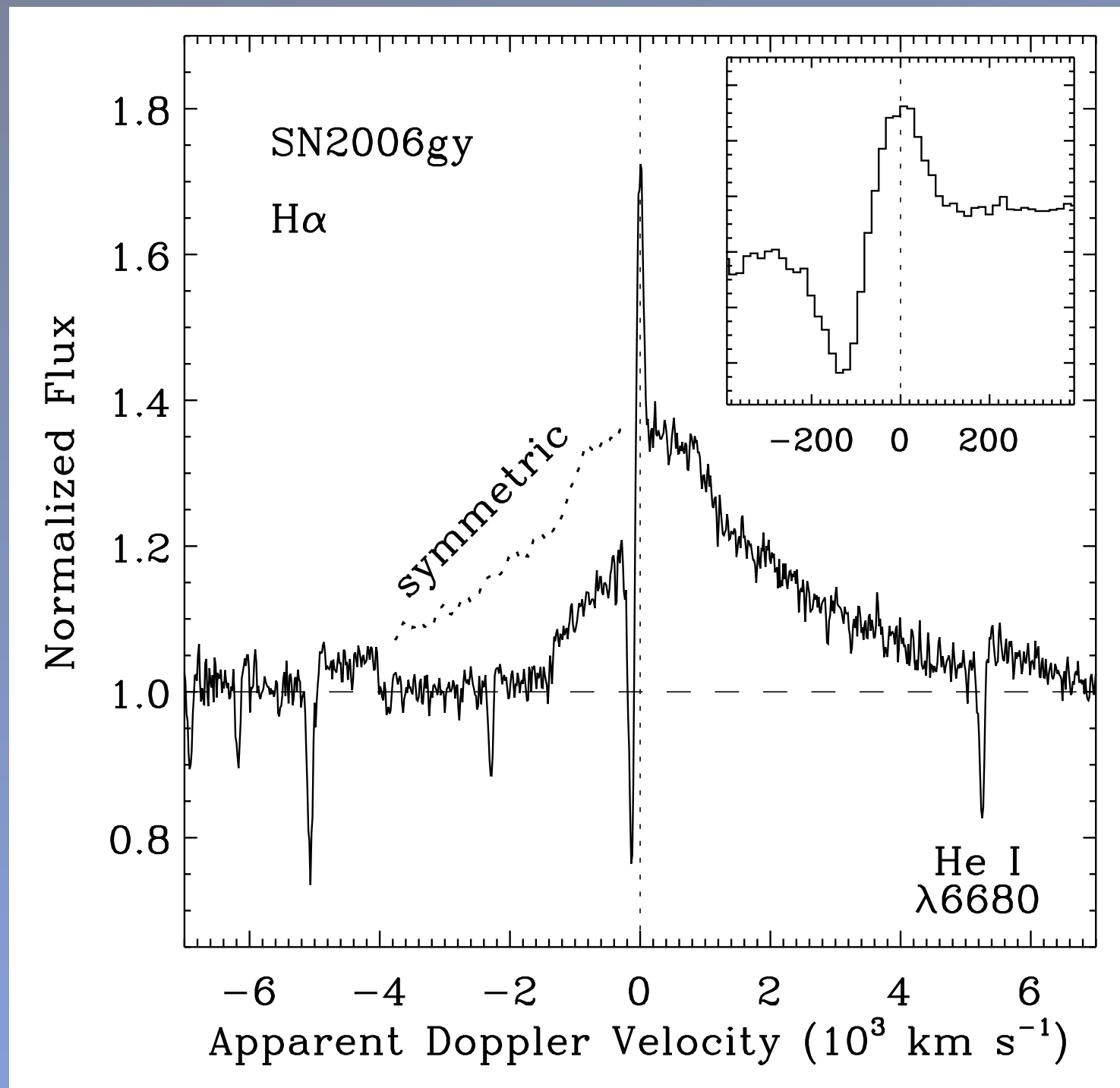
# SN 2006gy

- Most Luminous SN Ever
- Narrow H alpha emission with  $\sim 130$  km/s narrow absorption
- Found in S0 galaxy
- What's the progenitor?



Smith et al. 2007 (submitted)

# Absorption Velocity Implies Massive Progenitor

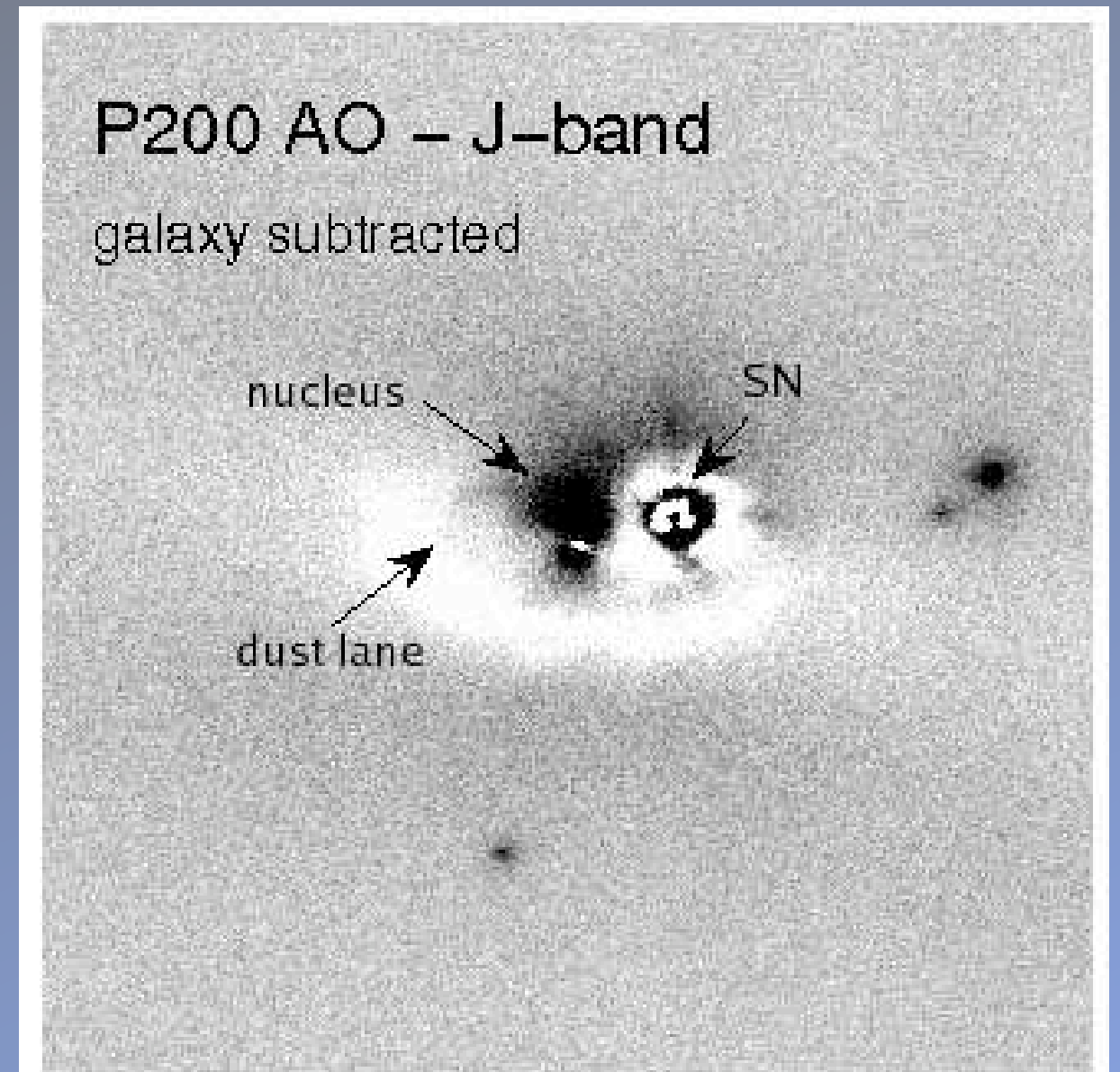


# Current Star Formation

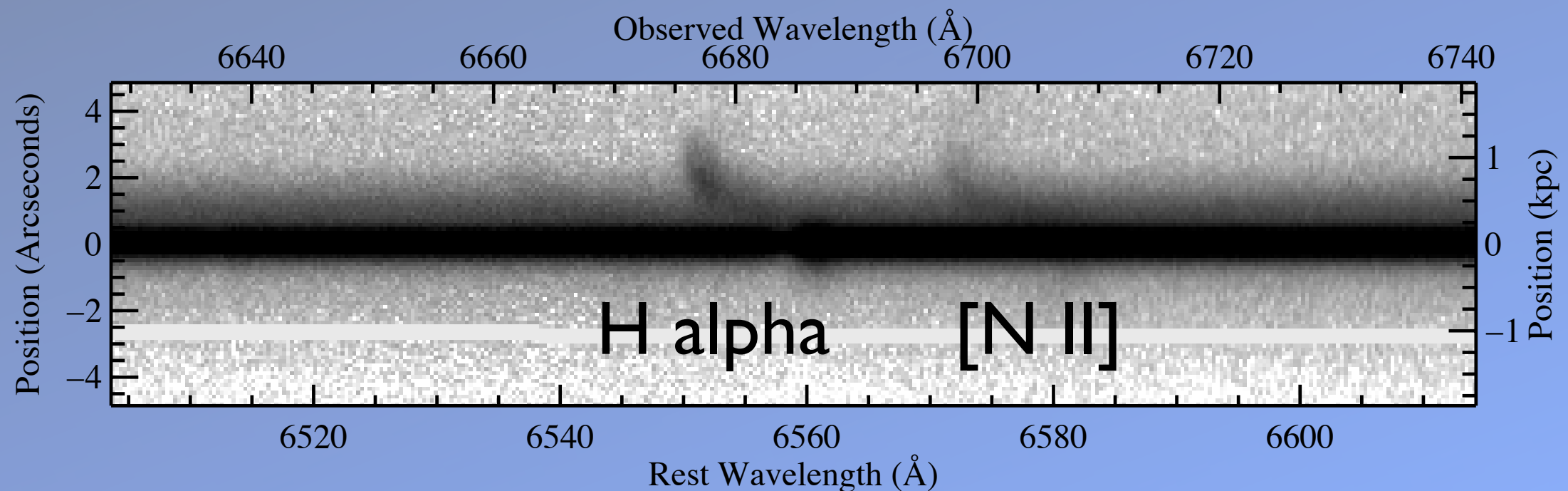
Dust Lane Detected

Galactic H alpha Detected

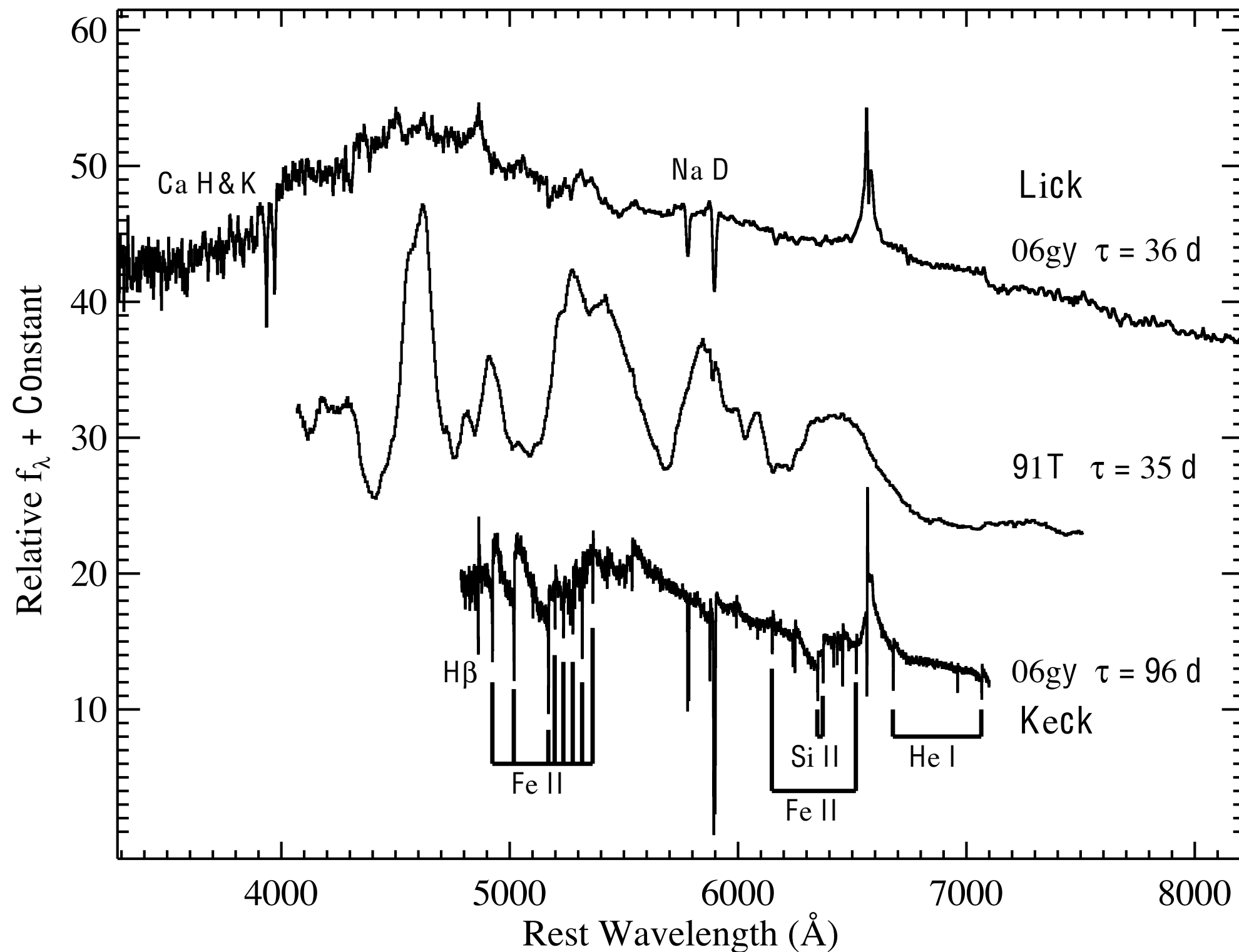
IRAS Emission Yields  
 $\text{SFR} = 1.2 M_{\text{sun}}/\text{year}$



Ofek et al. 2007 (submitted)

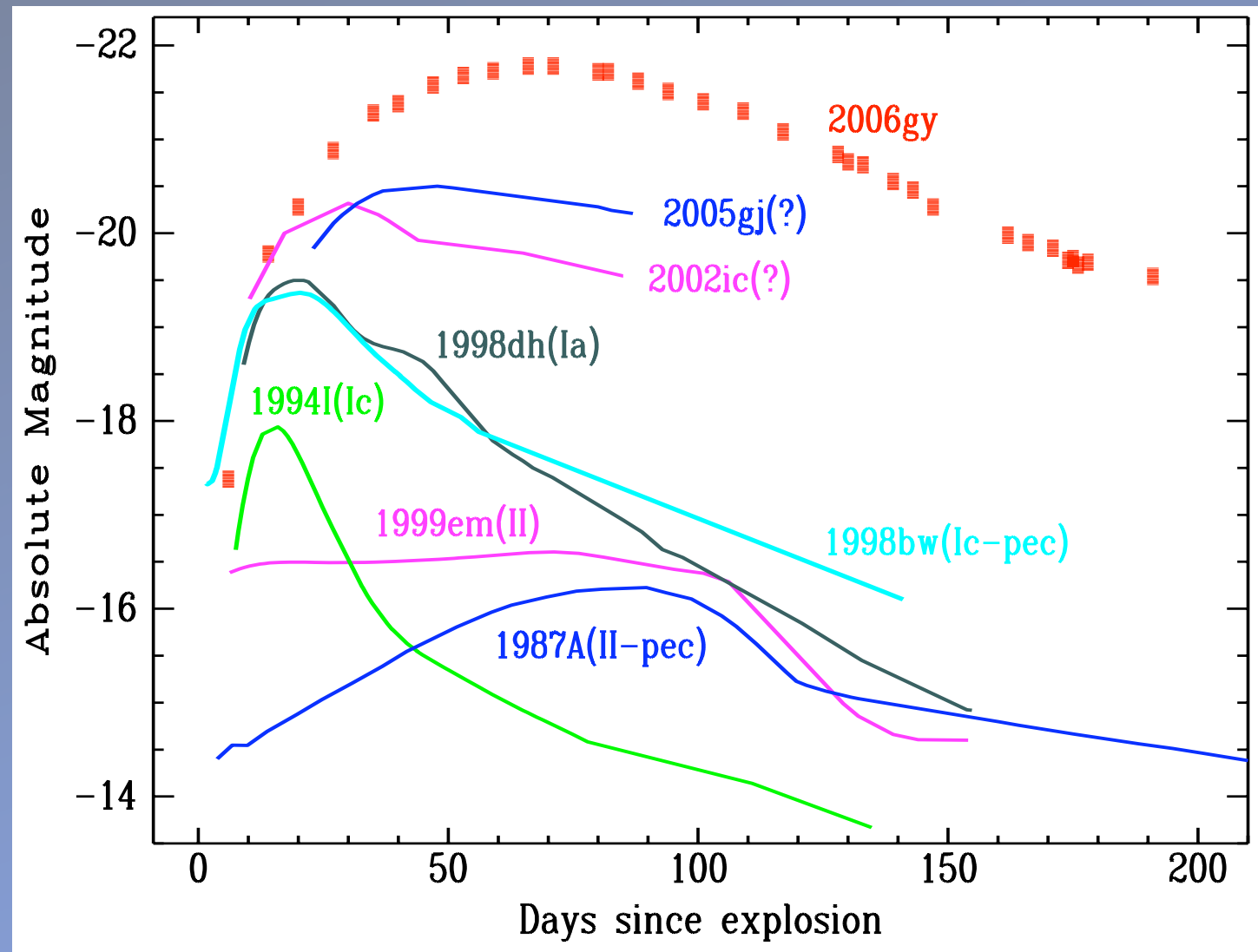


# Not a Ia Spectrum



# Energetics Suggest PI SN

- $E_{\text{rad}} = 10^{51}$  ergs
- $\dot{M} = 1\text{--}5 \times 10^{-4} M_{\text{sun}}/\text{year}$
- PI means  $22 M_{\text{sun}}$  of  $^{56}\text{Ni}$
- No Radio Detection
- Late-time Decline Is Key

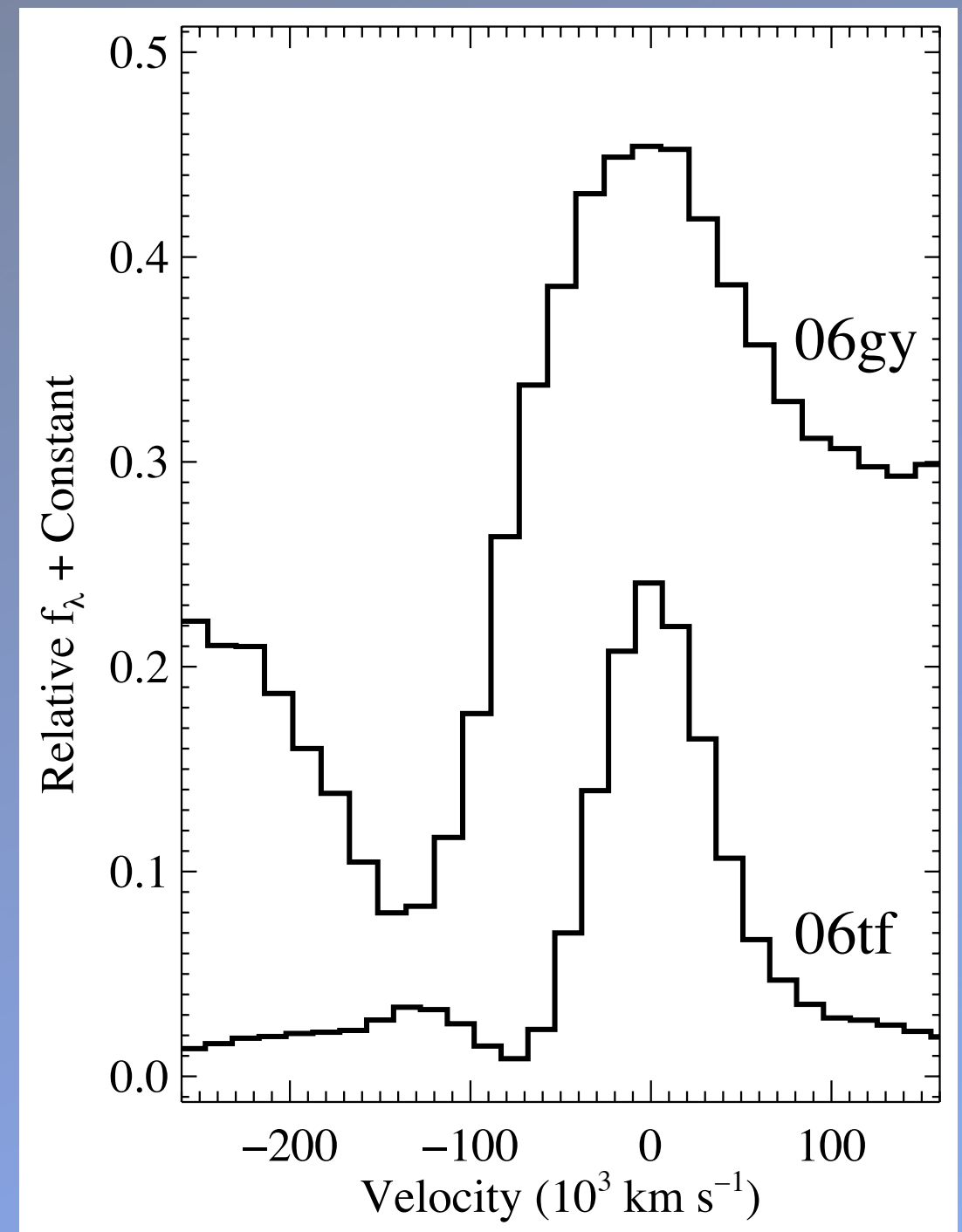
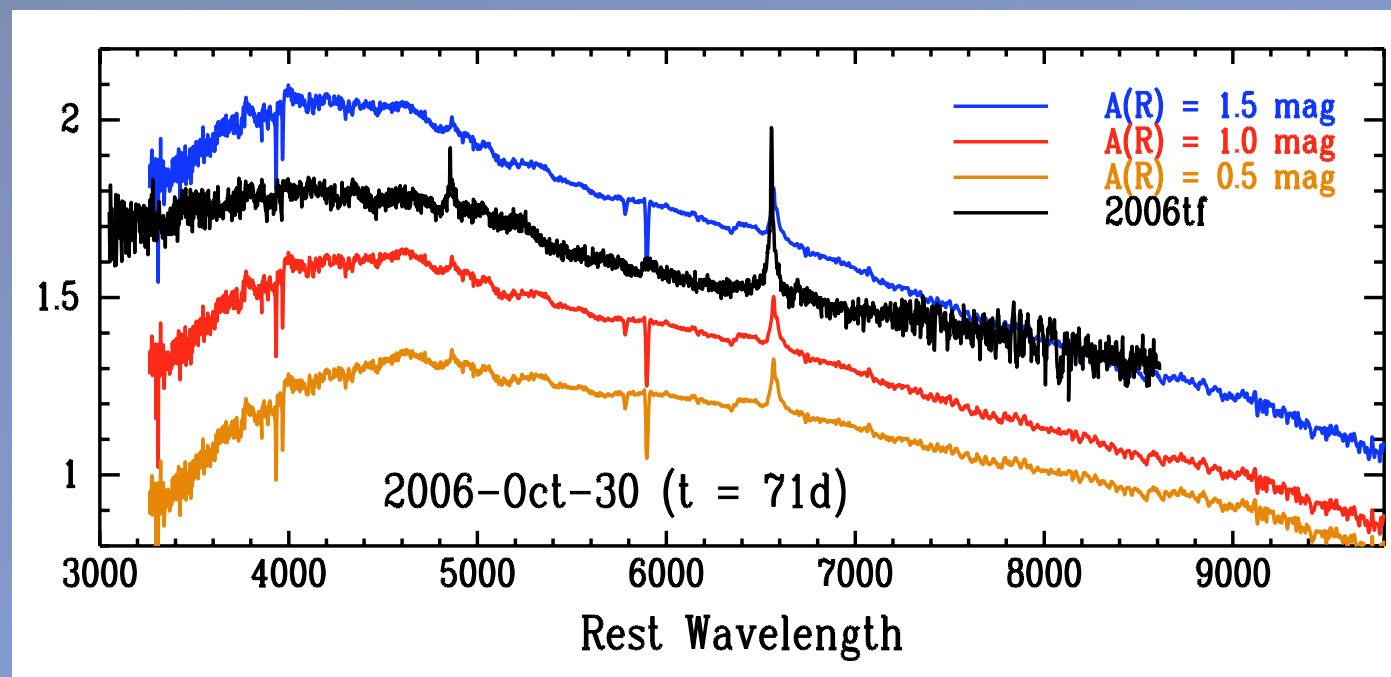


# SN 2006tf: Another Similar Event

Another Texas Discovery

H alpha absorption at  $\sim 80$  km/s

Stronger H alpha emission and  
larger H beta / H alpha ratio





# SN 2006jc

- WR Progenitor
- LBV-like Outburst
- He Shell
- Dust Heating (and Creation/Destruction)

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- Massive (LBV) Progenitor
- Possible Pair Instability SN
- Others Out There



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1st Grade  
20 Years Ago!



# X-Ray Detection

